IV. *Account of some experiments on the Torpedo electricus, at La Rochelle. By* John T. Todd, *Esq. Communicated by Sir* Everard Home, *Bart. V. P. R. S.*

Read December 5, 1816.

THE Royal Society having condescended to accept a Paper which I had the honor of submitting to them, through the kindness of Sir EVERARD HOME, on the subject of the Torpedo electricus, may perhaps, from the same motives, be induced to receive the following commencement of a set of experiments made at La Rochelle, unfortunately interrupted by some untoward circumstances.

The following series had for its principal object, to determine whether the Torpedo possessed any voluntary power over the electrical organs, either in exciting or interrupting their action, except through the nerves of these organs. They were made on board the fishing boats, immediately after the fish were caught.

The two Torpedos, the subjects of my first experiments, were of very different sizes; the one being about eight inches in length, and the other eighteen. They were of the same colour, light hazle grey, and mottled. The shocks were easily excited; those of the larger being much more severe. The fishermen held them by the tail without any apprehension of receiving the shock. They possessed the same security when they held them by that part between the

anterior extremities of the electrical organs. When the torpedos were placed in a bucket of water, the fishermen amused themselves by exposing the smaller fish to their electrical power.

EXPERIMENTS.

I intersected the large lateral cartilages of the smallest torpedo near their posterior connection with the trunk, and all the muscles inserted into them. The shocks continued to be received as before.

I divided in the same torpedo that part extending from the anterior part of the large lateral cartilages to the process projecting from the anterior part of the head. No alteration was observed in the production of the shocks.

The same experiments were repeated on the larger torpedo with the same results.

I removed the superior surface of the right electrical organ of the largest torpedo. Shocks were received as before.

I made a vertical and longitudinal incision two and a half inches in length, in both the electrical organs of the largest torpedo. I received the shocks as before.

The same experiments were repeated on the smallest one with the same results.

The torpedos in the intervals of the experiments were allowed to remain in water, and at this period they were allowed to remain a quarter of an hour. When examined, they seemed considerably exhausted. The smallest one was still capable of producing weak shocks. The largest one was less exhausted.

I continued the above-mentioned incisions in the largest one, so as to remove one half of each electrical organ. Shocks were still received, though weaker.

I repeated the same on the smaller one. The shocks were with difficulty distinguishable. I cannot attribute the weakness of the shocks more to the removal of a part of the organs, than to the exhaustion from repeated action.

The next subject of my experiments was about nine or ten inches in length, and of the same colour as the former ones. It was lively, and parted with its shocks freely. When held by the tail, or that part placed between the anterior extremities of the electrical organs, it was, as before observed, perfectly incapable of communicating the shocks.

I made an incision extending round the circumference of both organs, so as to leave no attachment between the electrical organs and the animal, except by the nerves. Shocks were received as before.

I removed the large lateral cartilages, and denuded a large portion of the surfaces of the electrical organs. After this change, two distinct shocks were received, but the animal being much injured, soon died.

In performing these experiments, I observed how powerfully the action of the electrical organs was excited by the cutting of the scalpel, and on one occasion pressing on the electrical organ with my left hand, and holding the scalpel wet in the other, while cutting the electrical organ, I received a distinct shock in the right hand through the scalpel. In dissecting these animals, I had also the occasion of remarking, that all the nerves of the electrical organs arise from the *medulla oblongata*, notwithstanding the long course which three of them are obliged to follow, before they penetrate the electrical organs.

The torpedo termed "*la tremble*" by the lower orders in

France, is met with in considerable quantities, as has been long known, on the whole extent of coast between the Loire and the Garonne. It is generally caught by the trawl. Though not esteemed, it is yet eaten by the poorer inhabitants, being first skinned and dried. The electrical organs are carefully avoided in eating, being considered to possess some disagreeable properties.